

MANUAL OF INSTRUCTIONS AND PARTS LIST

Model S
LUDLOW



Model S ***LUDLOW***

**installation
maintenance
adjustments
illustrations
and parts list**

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Installation of the Model S Ludlow

The Model S Ludlow machine should be placed at the front and center of a space approximately 5' x 7'. This will allow ample room for the machine as well as working space at the sides and at the back of the machine for cleaning, oiling and adjusting. The operator works in front of the machine, where additional space must be allowed for efficient operation.

Electrical Connections

For electric-heated machines, the power wires are connected to the control panel located on the right side of the machine. A No. 10 gauge main power supply wire is recommended.

Proper Seating and Levelling of the Model S Ludlow

The Ludlow should be placed on a metal plate, preferably on the Ludlow Metal Floor Pan, which is supplied as an accessory. In placing the Ludlow in position it is very important that the legs are "even" and do not create a twist in the frame.

To properly seat the Model S Ludlow machine:

1. Apply pressure on a corner of the cabinet and note which leg is not seating firmly on the floor pan.
2. Insert metal shims under one foot until the weight is evenly distributed on all four feet.

To properly level the machine from front to back:

1. Have locking mechanism in normal position and place a spirit level on the locking table from front to back.
2. An equal amount of metal shims should be placed under each of either the front or rear feet of the machine until the table is approximately level from front to back.

Assembly

The machine is crated and shipped practically completely assembled. A few parts are packed separately and should be installed as follows:

1. Install Mold. Be careful to thoroughly clean mold seat and bottom of mold before fastening in position. Tighten mold screws firmly in position.
2. Fill water tank and add soluble oil.
3. Connect water tubes to mold.
4. Fill the crucible with type metal, molten if possible, within one inch of top of the crucible.
5. While the crucible is heating out, check the following adjustments using the Jogging Switch where indicated:
 - Stick locking mechanism adjustment
 - The mouthpiece to mold adjustment
 - Position of the mouthpiece slot in relation to the mold

Maintenance

It will be apparent to even the most casual observer that the Ludlow Typograph machine is of rigid construction, has relatively few moving parts, and that the few simple adjustments that may be necessary to maintain its satisfactory operation are easily made.

Oiling

The Model S Ludlow Typograph machine should be thoroughly oiled twice each week, excepting the motor. New motors are oiled and inspected at the factory and, for normal one shift service, should not need additional oil during the first year. Add 4 to 7 drops of good light oil (SAE-20) or medium (SAE-30) mineral lubricating oil at the end of six months use, if used on a double shift, or at the end of one year if used on a single shift, or after 1,000 hours of service. Over-oiling is as undesirable as under-oiling.

The operator should make a practice of oiling all moving parts of the machine systematically, starting from the same place each time. By going through the same routine, only a few minutes will be required to lubricate the machine thoroughly.

Use Lubriclean Fluid on the moving parts of the Plunger mechanism of the crucible, which are subjected to heat, as this is a special preparation which will remain on heated

parts for a longer period of time than will ordinary lubricants.

The Felt Mouthpiece Wiper is treated with a special lubricant and should not require any additional oiling.

Ordinary oil is not recommended for the felt wiper, as it will carbonize and fill the mouthpiece air vents and obstruct the opening of the mouthpiece with a deposit which is difficult to remove.

Maintenance Schedule

- Every day:* Add oil in oilers and oil holes. Oil cams and cam rolls with "squirt" can.
- Twice a week:* Clean plunger and well.
- Once a week:* Clean entire machine.
- Twice a month:* Remove mouthpiece and clean mouthpiece and throat.

Cleaning the Plunger and Well

Free movement of the plunger in the well is dependent upon the thorough cleaning of these parts at least twice each week. A Plunger and Well Cleaning Kit is available for this purpose.

When cleaning the plunger and well, cover the mouthpiece with a Mouthpiece Opening Shield, to prevent the hot metal from splashing out of the mouthpiece when the plunger or well cleaning tool is being inserted into the well.

To clean the plunger, remove it from the crucible, using the combination Holder for the Plunger and Crucible Well Cleaner. While the plunger is still hot, wipe off the metal and loose deposits adhering to the outer surface and apply a light application of Lubrication Fluid with the asbestos swab. Allow the fluid to remain on the Plunger approximately two to three minutes before brushing off with a wire brush and wiping clean with a cloth. If a hard deposit in the form of a ring is noticed on the upper area of the plunger, it can best be removed with a strip of fine emery cloth.

Immediately after removing the plunger from the crucible for cleaning, place the Crucible Well Cleaner in the molten metal of the crucible (not in the well), to allow the tool to preheat to the temperature of the type metal, so it will be ready for immediate use when the plunger has been cleaned.

To clean the well, skim dross from surface of metal, assemble the preheated well cleaning tool to the holder. Place 8 or 10 drops of Lubriclean Fluid in a pool on top of the metal immediately over the well and insert the cleaning tool in the well and work it in an oscillating and up-and-down motion. The oil on the surface of the metal will transfer to the cleaning tool and keep it lubricated. Remove the cleaning tool frequently to wipe off the dross, continuing this operation until the well is cleaned. If the well has not been cleaned regularly, it may be necessary to apply the fluid to the top of the metal two or three times during the cleaning operation.

Before replacing the plunger in the well, skim the dross and Lubriclean residue from the surface of the type metal. Apply a thin coating of Lubriclean to the plunger, and see that it floats freely in the well before assembling it to the plunger lever.

Care should be taken not to drop or bump the plunger or the well cleaning tool against a hard object, as this may mar

or upset the surface of these parts, with resultant damage to the well.

If the well cleaning tool becomes ineffective, the four segments can be expanded slightly by careful use of a screw driver or like tool to spring the segments farther apart.

Special patented preparations and tallow should be avoided as a lubricant or cleaner for plunger and well.

Failure to keep the plunger and well clean will invariably result in an unsatisfactory printing face and porous slugs.

Care of Mouthpiece

The grayish-black deposit which accumulates on the vented surface and in the slot of the mouthpiece can easily be removed when hot by the use of Ludlow Lubriclean Fluid. The fluid is applied on the vented surface and in the slot of the mouthpiece and allowed to remain for two to three minutes, when the slot may be scraped clean with the Mouthpiece Slot Scraper. The three holes in the mouthpiece may be cleaned with a piece of wire 1/16 inch in diameter. If necessary, the surface may be carefully brushed clean with a wire brush before removing mouthpiece for a thorough cleaning of the throat.

It is advisable to remove the mouthpiece from the crucible at least twice a month to clean the lower part of the mouthpiece and to scrape the side walls of the crucible throat. When cleaning the crucible throat, reduce the metal level by bailing until the top of the well is exposed. To prevent molten metal from entering the screw holes, it is best to replace the mouthpiece screws before scraping the throat of the crucible. With the crucible prepared as above, the Crucible Throat Scraper should be used to scrape the walls of the throat before reassembling the mouthpiece to the crucible. When assembling the mouthpiece to the crucible, the screws should be treated with graphite, to insure their easy removal. No

graphite should be put into the screw holes. After the mouthpiece has been assembled to the crucible, cast several blank slugs to thoroughly clean the throat before casting typeface slugs.

Metal Level in the Crucible

Always try to keep metal level approximately $\frac{3}{4}$ inch below the top of the crucible. If the metal level is permitted to drop below the top of the heating elements, these elements, when heated, can be damaged by their exposure to the air. A low level will also have considerable effect on the quality of the slug. The metal level may be accurately regulated by the use of an automatic metal feeder. For the Model S Ludlow the use of a metal feeder is strongly recommended for good quality slugs.

Care of the Metal

To secure best results, high quality metal should be used in the Ludlow, as in any line-casting machine. Metal which contains improper proportions of lead, tin and antimony, or which is contaminated with copper, zinc, or other foreign substance, will cause considerable trouble. An indication of this trouble will appear in a poor printing face on the slug. In some cases these impurities will form obstructions in the throat and mouthpiece and make it impossible to obtain a satisfactory slug. Any of the leading metal companies will gladly furnish an analysis of the metal from a sample and will advise you of its condition. About a pound of metal will be necessary for proper analysis and this sample may be obtained by casting blank slugs.

It is not intended that any metal other than either standard Ludlow or standard Linotype metal be used in the Ludlow crucible. Standard Ludlow metal contains 6% tin, $11\frac{1}{2}\%$ antimony, and the balance lead. Standard Linotype metal con-

tains 4% tin, $11\frac{1}{2}\%$ antimony, and the balance lead. Trouble may be expected when the tin drops below $3\frac{3}{4}\%$, or when the antimony drops below $11\frac{1}{4}\%$ or goes over 12%.

Type metal should not contain copper or zinc, and only a trace of arsenic.

Metal Temperature

For standard Linotype metal the temperature of the metal under normal conditions should be 565° F. For standard Ludlow metal the temperature may be increased from 5° to 10° . It is important to note that these temperatures are approximate and of necessity must vary depending upon the condition of the metal, the size mold being used and other conditions. The temperature must be adjusted to obtain best results in each individual case.

Machine Must be Kept Clean

The greatest cause of trouble results from failure of the operator to keep his machine clean. As with all hot metal machines, satisfactory operation depends upon perfect contact between matrices, mold and mouthpiece. If particles of metal or other foreign material adhere to the mold, the mouthpiece or the matrices, this perfect contact will not be maintained; or if particles of metal, such as trimmings, etc., become lodged in the cams, trouble will inevitably result.

The foreman in charge of a Ludlow Typograph machine will find that if some one person is made responsible for the maintenance of the machine and is allotted a certain time each day for this work, his effort will be repaid many times by increased production and freedom from repairs and replacements.

The operator should be provided with a stiff bristle brush to remove the particles of metal from the working parts, such as the cams, slides, etc. This should be done frequently. At

least once each week the operator should clean the entire machine and remove all accumulations of dust and metal trimmings.

Care of Matrices and Spaces

Ludlow matrices and spaces should be handled carefully at all times. Rough handling will shorten the life of matrices and spaces and cause the slugs to stick to the matrices in the casting operation, due to burrs on the face notch of the

matrices. Improper gather, the "clicking" or "snapping" of matrices on the sides of the stick or against each other, rough handling of the matrices and stick on the table top will shorten the life of the matrices and spaces and cause difficulty. When tightening the matrices in position before casting, the knob on the stick should be tightened only tightly enough to hold the matrices in position but not so tightly that the mold and equalizing bar cannot equalize the height of the matrices before the slug is cast.

Adjustments

Before the machine leaves the factory, all of its parts have been tested and properly adjusted. However, after the machine has been in use for some time, it may become necessary to readjust some parts. The following instructions should be closely and carefully followed:

Safety Mechanisms

Before making any adjustments, unlatch and remove the lock-down table. See that the Safety Finger is over the end of the Plunger Cam Lever.

The Safety Operating Lever is connected to the locking-down mechanism and operates the Safety Finger, permitting a cast to be made only when the stick is properly locked in position. This is an important safety feature, and care should be taken to see that these parts and parts connected to them are in perfect operating order. Particular attention should be given to the Spring which is connected to the Safety Finger. This spring keeps the safety mechanism in the non-casting position, and the machine should never be allowed to operate without the spring. Always observe the condition of the spring before making any other adjustments or repairs.

The Locking Slide Safety Pawl Bumper is so designed that if the end quad on the stick or the division quad does not strike the bumper, the stick cannot be locked in place. The operator should see that this bumper does not become clogged

with dirt or metal that might interfere with its operation.

The Locking Slide Safety Pawl is so arranged that the stick of matrices must be pushed against the stick stop before the stick can be locked in place to make a cast. This pawl should also be kept clean and free from dirt or metal that might interfere with its operation.

Plunger Height Adjustment

This adjustment is made at the factory and will probably require no further adjusting unless the Crucible is removed.

The plunger should be so adjusted that its bottom edge is 1/16th inch above the lower edge of the port in the well. This adjustment may be checked by removing the Cotter Pin and Connecting Pin. This will permit the plunger to float in the well. A piece of wire 1/16 inch in diameter should be bent into an "L" shape, so that one end may be inserted through the molten metal into the porthole of the well of the crucible. After the wire has been inserted through the porthole, the plunger should be pressed down upon the wire. With the plunger in this position, the hole in the Plunger Connecting Lever should line up with the hole in the Connecting Rod. If these holes are not in alignment, loosen the Check Nut at the bottom of the Connecting Rod and turn the Connecting Rod up or down as required. After adjustment is completed, tighten the Check Nut and replace all parts.

Any variation from the correct setting of the plunger will result in hollow slugs, unsatisfactory face, or both.

Stick Stop Adjustment

The stick stop should be so adjusted that when a line is cast the head of the slug is exactly even with the shank of the slug on the end farthest from the operator. This adjustment may be made by loosening the small Set Screw in the top of the stick stop slide and turning the Adjusting Screw in or out until the proper alignment is obtained, after which tighten the set screw. Check this adjustment by casting another line, using the same stick.

Locking Slide Adjustment

When a stick of matrices is placed in the machine and locked in position, it is pushed against the Locking Guide by the Locking Slide Shoe and the spring tension of the two Locking Slide Shoe Springs. These springs sometimes become weakened after long usage and require replacement. If the head of the slug is not parallel to the shank, it may be that these springs do not have sufficient tension to hold the stick of matrices firmly against the locking guide at the time the cast is made, or that the locking guide itself is out of alignment.

The locking guide is adjustable so that the proper alignment of the stick may be maintained at all times. To make this adjustment, the Locking Guide Screws should be loosened, which will permit the turning of the Locking Adjusting Screws. Very little movement of these screws will be necessary to obtain the proper adjustment. Tighten the Screws while the stick is locked in position.

Ejector Blade

If the Ejector Blade is removed for any reason, clean the shoulder upon which it rests very thoroughly before it is replaced, as any dirt or metal on this shoulder will tip the

ejector and cause a drag on the ribs of the slug. The top surface of the Ejector Blade must be parallel with the top of the mold and must be set from .020" to .050" above the top of the mold.

Crucible Mouthpiece to Mold Adjustment

Remove the table. See that the safety finger is over the end of the plunger cam lever. Use jogging switch to bring mold over the mouthpiece. The clearance between the mold and the mouthpiece in this position should be checked with a feeler gage. The clearance should not be more than .003", and mouthpiece slot should be centered to the mold opening.

Should the reading be more than .003", loosen the check nuts on all crucible adjusting screws, and turn screws until feeler gage has a slip fit between the mold and the mouthpiece for the entire length of the mouthpiece.

Before tightening check nuts, check centering of the mouthpiece opening to the mold. Should an adjustment be necessary, move the crucible in the direction to correct the adjustment.

Then tighten check nuts while holding the crucible adjusting screws firmly in position with a screwdriver. Use jogging switch to check the free movement of the mold (.003").

Reassemble table and safeties.

Mold to Stick Height Adjustment

This adjustment is made at the factory and will probably require no further adjustments unless the mold slide support is removed.

When the mold slide support has been removed or check nuts and gib screws have been loosened, the mold to table height must be adjusted.

Lower the crucible as much as possible to have clearance between mold and mouthpiece. See that safety finger is over end of the plunger cam lever. Reassemble table and disconnect safety connecting rod on top of table. Use the jogging switch

to bring mold into opening of table at casting position. Insert the blank slug block, which will contact face of the mold without being locked down. Use feeler gage to determine clearance between the blank slug block and table top in this position. The correct clearance between the table top and the sides of the blank slug block should be .020"/.028".

If this clearance is more than .028", check nuts on both sides of the mold slide support should be tightened carefully until the blank slug block is .020" to .028" above the table. Tighten all gib set screws and lock check nuts.

If the clearance is less than .020", loosen check nuts on both sides of the mold slide support evenly until the blank slug block has a clearance of .020"/.028". Tighten all gib set screws and lock check nuts.

After these settings have been completed, the crucible mouthpiece to mold adjustment has to be made as prescribed. Please follow instructions carefully.

Electric-Heated Crucible

The Ludlow Electric Crucible is so constructed and wired that the terminals, switches, circuit breakers, etc. are readily accessible.

All terminals and wires are plainly marked and correspond to the markings as shown in the wiring diagram.

The main feed wires enter the bottom of the control panel and are connected to the terminals as shown.

From the main hand switch, the wiring is divided into two circuits, as follows:

Crucible Heater Circuit
Motor Circuit

These circuits are illustrated on the wiring diagram for convenient tracing.

Machine Must Be Grounded

All tests are based on the supposition that the machine is grounded. In most cases the machine is grounded by the line wire conduit. In case an adequate ground is not so established, it will be necessary to connect a No. 10 wire between the frame of the machine and a water pipe, or some other safe means of transmission to the ground.

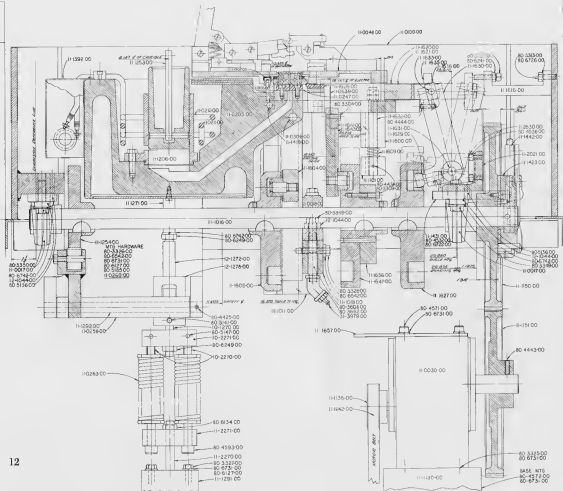
Preliminary Tracing of Electrical Trouble

All circuits are protected by circuit breakers. In case of ground or short, circuit breaker goes automatically to "off" position. When trouble is corrected, switch circuit breaker to "on" position. Other indications of electrical trouble will be variations of temperature of the type metal in the crucible or at the mouthpiece, or stopping of machine. Variations of temperature have to do with the crucible, throat heaters or circuits. Starting or stopping of the motor is confined to the motor circuit.

Crucible Solid-State Control Adjustment

Insert hot metal thermometer into the crucible metal and allow sufficient time for the thermometer reading to reach the temperature of the metal. Loosen the set screws on the temperature indicating knob and move knob until the reading on the knob corresponds to the temperature reading shown on the thermometer, and then tighten the set screws. Should the solid-state control be damaged the entire unit should be replaced.

Plate No. 1



Main Machine Assembly • Plate No. 1

Part No.	Description	Part No.	Description
11 0017 00	Main Shaft End Bearing	11 1442 00	Clutch Release Bracket
11 0018 00	Main Shaft Center Bearing	11 1600 00	Mold Slide Support
11 0030 00	Speed Reducer Assembly	11 1604 00	Table Slide
11 0048 00	Table & Lockdown Assembly	11 1605 00	Table Cam
11 0100 00	Main Frame Sub-Assembly	11 1609 00	Mold Slide Support Adjusting Spring
11 0205 00	Crucible Assembly	11 1616 00	Mold Slide Back Stop
11 0211 00	Crucible Heater—Front (Specify Voltage)	11 1620 00	Mold Slide
11 0212 00	Crucible Heater—Rear (Specify Voltage)	11 1621 00	Mold Slide Clevis
11 0247 00	Mouthpiece	11 1626 00	Trim Knife
11 0258 00	Plunger Cam Lever Assembly	11 1627 00	Mold Cam
11 0260 00	Plunger Cam Lever Bracket Assembly	11 1629 00	Cam Roll Stud
11 0263 00	Plunger Spring Sub-Assembly	11 1630 00	Mold Slide Drive Arm
11 0306 00	Mouthpiece Heater (Specify Voltage)	11 1631 00	Mold Slide Drive Arm Pin
11 0639 00	Ejector Blade & Shim Assembly (6-Point)	11 1632 00	Mold Slide Adjusting Screw
11 1011 00	Table Slide Guide—Rear	11 1633 00	Mold Slide Clevis Pin
11 1016 00	Main Shaft	11 1635 00	Mold Slide Stop Block
11 1018 00	Main Shaft Bearing Support	11 1636 00	Clevis Slide Block
11 1101 00	Mold Slide Support Anchor—Rear	11 1641 00	Ejector Blade Clamp
11 1130 00	Support Bracket	11 1643 00	Ejector Blade Slide
11 1136 00	Speed Reducer Pulley	11 1647 00	Ejector Cam
11 1142 00	Drive Belt	11 1656 00	Delivery Cam
11 1150 00	Main Shaft Drive Gear	11 1806 00	Wiper Mount
11 1151 00	Speed Reducer Gear	11 1807 00	Mouthpiece Wiper Clamp
11 1206 00	Crucible Well	11 2021 00	Mold Slide Pinion Bracket
11 1253 00	Plunger Link	11 2630 00	Mold Slide Drive Arm Pivot
11 1254 00	Plunger Cam	12 1044 00	Special Washer
11 1271 00	Plunger Connecting Rod—Upper	31 3979 00	Hydraulic Grease Fitting
11 1292 00	Plunger Cam Lever Shaft	80 3304 00	$\frac{1}{4}$ -20 x $\frac{3}{4}$ " long Hexagon Head Cap Screw
11 1392 00	Crucible Heater Terminal Cover	80 3313 00	$\frac{5}{16}$ -18 x $\frac{1}{8}$ " long Hexagon Head Cap Screw
11 1418 00	Temperature Control Sensor	80 3328 00	$\frac{3}{8}$ -16 x $1\frac{1}{4}$ " long Hexagon Head Cap Screw
11 1423 00	Clutch Body	80 3347 00	$\frac{1}{2}$ -13 x $1\frac{1}{4}$ " long Hexagon Head Cap Screw
11 1431 00	Clutch Release Bracket Support	80 3349 00	$\frac{1}{2}$ -13 x $1\frac{1}{2}$ " long Hexagon Head Cap Screw

Main Machine Assembly • Plate No. 1

Part No.	Description
80 3522 00	$\frac{3}{8}$ -16 x $1\frac{1}{2}$ " long Square Head Set Screw
80 3608 00	$\frac{1}{8}$ " x $3\frac{1}{4}$ " long Nipple—Threaded Both Ends
80 3662 00	$\frac{1}{8}$ " x 45° Elbow
80 4425 00	10-32 x $\frac{3}{8}$ " long Cup Point Socket Set Screw
80 4438 00	$\frac{1}{4}$ -20 x $\frac{3}{4}$ " long Cup Point Socket Set Screw
80 4444 00	$\frac{1}{4}$ -20 x 1" long Half Dog Point Socket Set Screw

Part No.	Description
80 4538 00	$\frac{1}{4}$ -20 x $\frac{1}{2}$ " long Socket Cap Screw
80 5136 00	$\frac{1}{4}$ " dia. x $\frac{7}{8}$ " long Hardened Dowel
80 6241 00	$\frac{3}{8}$ -16 Jam Nut
80 6542 00	$\frac{3}{8}$ " Bolt Size x $\frac{3}{4}$ " OD x $\frac{3}{16}$ " Thick Washer
80 6564 00	$\frac{1}{2}$ " Bolt Size x $1\frac{1}{4}$ " OD x $\frac{3}{32}$ " Thick Washer
80 6726 00	$\frac{3}{16}$ " Bolt Size Plain Lock Washer
80 6742 00	$\frac{1}{2}$ " Bolt Size Plain Lock Washer

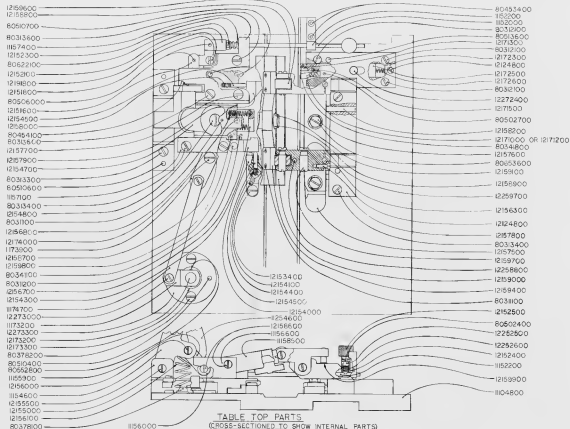
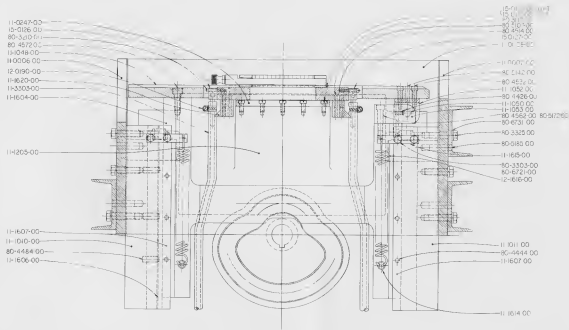


Table and Lockdown Mechanism • Plate No. 2

Part No.	Description	Part No.	Description
11 1043 00	Table	12 1550 00	Locking Lever Fulcrum
11 1520 00	Locking Release Rod	12 1555 00	Locking Lever Anchor
11 1522 00	Locking Release Rod Support	12 1560 00	Locking Lever Link Stud
11 1546 00	Locking Lever Body	12 1561 00	Locking Lever Spring
11 1559 00	Locking Lever Link	12 1563 00	Locking Equalizing Bar Clamp Adjusting Screw
11 1560 00	Locking Lever Link Slide Spacer	12 1567 00	Locking Slide Shoe
11 1566 00	Locking Slide	12 1568 00	Locking Slide Shoe Spring
11 1571 00	Locking Slide Guide—Front	12 1575 00	Locking Guide
11 1574 00	Locking Slide Guide—Rear	12 1576 00	Locking Guide Screw
11 1585 00	Locking Equalizing Lever	12 1577 00	Locking Slide Guide Screw
11 1732 00	Safety Clutch Shaft	12 1578 00	Lockdown Bracket
11 1739 00	Safety Operating Lever	12 1579 00	Locking Slide Safety Pawl—Rear
11 1747 00	Safety Connecting Rod	12 1580 00	Locking Slide Safety Pawl Spring
11 2546 00	Locking Lever Arm	12 1582 00	Stick Stop Slide and Locking Adjusting Block Guide Adjusting Screw—Front
12 1248 00	10-30 x 1/2" long Fillister Head Screw	12 1586 00	Locking Equalizing Lever Stud
12 1516 00	Locking Release Catch	12 1587 00	Locking Equalizing Lever Spring
12 1518 00	Locking Release Bell Crank	12 1588 00	Locking Equalizing Bar Clamp
12 1521 00	Locking Release Rod Yoke	12 1589 00	Locking Equalizing Bar Lock Washer
12 1522 00	1/16" dia. x 9/32" long Dowel Pin	12 1590 00	Locking Equalizing Bar
12 1523 00	Locking Release Rod Spring	12 1591 00	Locking Equalizing Bar Stud
12 1524 00	Locking Release Positive Clutch Sleeve	12 1594 00	Locking Equalizing Bar Shoe
12 1525 00	Locking Release Positive Clutch Knob	12 1596 00	Locking Equalizing Bar Roller
12 1534 00	Locking Slide Safety Pawl Bumper Fulcrum Screw	12 1597 00	Locking Equalizing Bar Clamp Roller Fulcrum
12 1540 00	Locking Slide Safety Pawl Bumper— (21-EM)—(Sold as assembly only)	12 1598 00	Locking Slide Safety Pawl Fulcrum
12 1541 00	Locking Slide Safety Pawl Bumper Pin	12 1599 00	Locking Equalizing Bar Rest Screw
12 1543 00	Locking Slide Safety Pawl	12 1710 00	Stick Stop (for 21 EM)
12 1544 00	Locking Slide Safety Spring	12 1713 00	Stick Stop Adjusting Screw Set Screw
12 1545 00	Locking Slide Safety Pawl Plunger	12 1715 00	Stick Stop Spring
12 1547 00	Locking Lever Handle	12 1723 00	Stick Stop Slide Bumper Block
12 1548 00	Locking Lever Handle Screw		

Table and Lockdown Mechanism • Plate No. 2

Part No.	Description	Part No.	Description
12 1725 00	Stick Stop Slide	80 3411 00	8-36 x 5/32" long Oval Point Slotted Headless Set Screw
12 1726 00	Stick Stop Slide Spring	80 3418 00	10-30 x .360/.350" long Flat Point Slotted Headless Set Screw
12 1730 00	Safety Lever	80 3781 00	1/4-20 x 3/8" long Round Head Screw
12 1733 00	Safety Lever Shaft Bearing	80 3782 00	1/4-20 x 1/2" long Round Head Screw
12 1735 00	Safety Clutch—Upper	80 4534 00	1/4-20 x 1 3/4" long Socket Cap Screw
12 1740 00	Safety Operating Lever Fulcrum	80 4541 00	1/4-20 x 3/4" long Button Head Socket Screw
12 1918 00	Locking Release Bell Crank Stud	80 5024 00	3/32" dia. x 3/8" long Dowel Pin
12 2525 00	Locking Release Positive Clutch Pin	80 5027 00	3/32" dia. x 7/16" long Dowel Pin
12 2526 00	Locking Release Positive Clutch Spring	80 5060 00	1/8" dia. x 9/16" long Dowel Pin
12 2588 00	Locking Equalizing Bar Clamp Spring	80 5104 00	3/16" dia. x 1/2" long Dowel Pin
12 2597 00	Locking Equalizing Bar Clamp Roller Fulcrum	80 5106 00	3/16" dia. x 5/8" long Dowel Pin
12 2724 00	Stick Stop Slide Pin	80 5107 00	3/16" dia. x 3/4" long Dowel Pin
12 2730 00	Safety Lever Screw	80 5109 00	3/16" dia. x 7/8" long Dowel Pin
12 2733 00	Safety Lever Shaft Bearing Plate	80 5136 00	1/4" dia. x 7/8" long Dowel Pin
80 3111 00	8-36 x 3/4" long Fillister Head Screw	80 5528 00	No. 2 Taper Pin—1" long
80 3112 00	8-36 x 5/8" long Fillister Head Screw	80 6221 00	10-32 x 1/8" thick Jam Nut
80 3121 00	1/4-20 x 7/8" long Fillister Head Screw	80 6536 00	5/16" Bolt Size x 11/16" OD x 1/16" thick Washer
80 3133 00	5/16-18 x 3/4" long Fillister Head Screw		
80 3134 00	5/16-18 x 7/8" long Fillister Head Screw		
80 3136 00	5/16-18 x 1 3/8" long Fillister Head Screw		

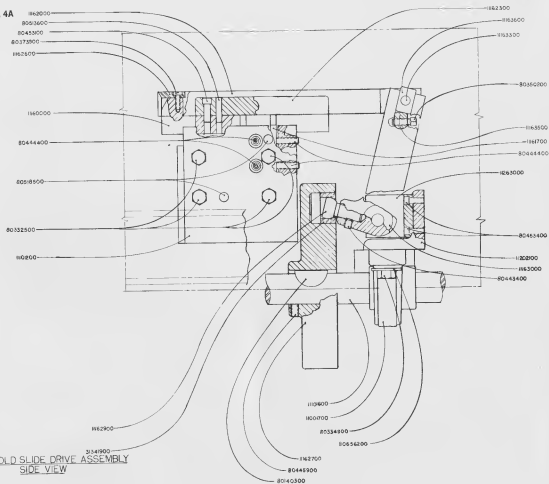


MAIN FRAME & MOLD SLIDE ASSEMBLY SECTION

Main Frame and Mold Slide Mechanism - Plate No. 3

Part No.	Description	Part No.	Description
11 0006 00	Frame—Front Plate	15 0126 00	Mold Connection Assembly—Front
11 0007 00	Frame—Rear Plate	15 0127 00	Mold Connection Assembly—Rear
11 0008 00	Frame—Left Plate	80 3117 00	$\frac{1}{4}$ -20 x $\frac{1}{2}$ " Long Flat Fillister Head Screw
11 1010 00	Table Slide Guide—Front	80 3210 00	8-32 x $\frac{3}{4}$ " long Oval Fillister Head Screw
11 1011 00	Table Slide Guide—Rear	80 3303 00	$\frac{1}{4}$ -20 x $\frac{5}{8}$ " long Hexagon Head Cap Screw
11 1048 00	Table	80 3325 00	$\frac{3}{8}$ -16 x $1\frac{1}{2}$ " long Hexagon Head Cap Screw
11 1050 00	Table Hinge Pin	80 4426 00	10-32 x $\frac{1}{2}$ " long Cup Point Socket Set Screw
11 1052 00	Table Hinge	80 4444 00	$\frac{1}{4}$ -20 x 1" long Half Dog Point Socket Set Screw
11 1053 00	Table Hinge Block	80 4484 00	$\frac{3}{8}$ -16 x 1" long Half Dog Point Socket Set Screw
11 1205 00	Crucible	80 4514 00	10-32 x $\frac{3}{4}$ " long Socket Cap Screw
11 0247 00	Mouthpiece	80 4532 00	$\frac{1}{4}$ -20 x $\frac{7}{8}$ " long Socket Cap Screw
11 1604 00	Table Slide	80 4562 00	$\frac{5}{16}$ -18 x $1\frac{1}{4}$ " long Socket Cap Screw
11 1606 00	Table Slide Gib—Front	80 4572 00	$\frac{3}{8}$ -16 x 1" long Socket Cap Screw
11 1607 00	Table Slide Gib—Side	80 5107 00	$\frac{3}{16}$ " dia. x $\frac{3}{4}$ " long Dowel Pin
11 1614 00	Table Slide Spring Stud	80 5142 00	$\frac{1}{4}$ " dia. x 1" long Dowel Pin
11 1615 00	Table Slide Spring Retainer	80 5172 00	$\frac{5}{16}$ " dia. x $1\frac{1}{2}$ " long Dowel Pin
11 1620 00	Mold Slide	80 5185 00	$\frac{3}{8}$ " dia. x $1\frac{3}{8}$ " long Dowel Pin
11 3303 00	Mold Hose—30" long	80 6721 00	$\frac{1}{4}$ " Shakeproof Washer
12 0190 00	Water Hose Clamp	80 6731 00	$\frac{3}{8}$ " Plain Lock Washer
12 1616 00	Table Slide Spring		
15 0106 00	Mold Assembly (6-Point)		
15 0112 00	Mold Assembly (12-Point)		

Plate No. 4A



MOLD SLIDE DRIVE ASSEMBLY
SIDE VIEW

Mold Slide Drive Assembly - Plate No. 4A

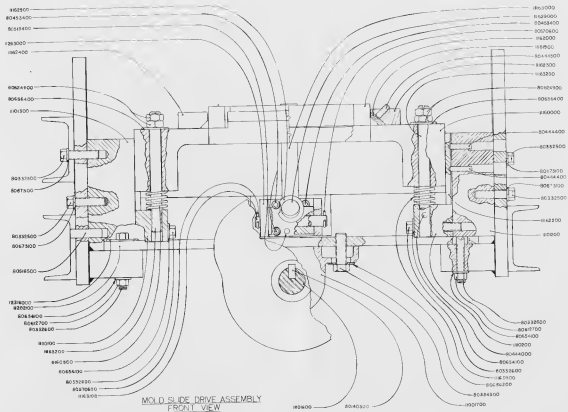
Part No.	Description	Part No.	Description
11 0017 00	Main Shaft End Bearing	80 3325 00	$\frac{3}{8}$ -16 x $1\frac{1}{2}$ " long Hexagon Head Cap Screw
11 1012 00	Ejector & Mold Slide Support Guide—Front	80 3349 00	$\frac{1}{2}$ -13 x $1\frac{1}{2}$ " long Hexagon Head Cap Screw
11 1016 00	Main Shaft	80 3502 00	$\frac{1}{4}$ -20 x $\frac{3}{4}$ " long Square Head Set Screw
11 1600 00	Mold Slide Support	80 3739 00	8-32 x $\frac{1}{2}$ " long Pan Head Machine Screw
11 1617 00	Mold Slide Support Gib	80 4434 00	$\frac{1}{4}$ -20 x $\frac{3}{8}$ " long Half-Dog Point Socket Set Screw
11 1620 00	Mold Slide	80 4444 00	$\frac{1}{4}$ -20 x 1" long Half Dog Point Socket Set Screw
11 1623 00	Mold Slide Gib—Front	80 4459 00	5/16-18 x $\frac{1}{2}$ " long Cup Point Socket Set Screw
11 1626 00	Trim Knife	80 4531 00	$\frac{1}{4}$ -20 x $\frac{3}{4}$ " long Socket Head Cap Screw
11 1627 00	Mold Cam	80 4534 00	$\frac{1}{4}$ -20 x $\frac{5}{8}$ " long Socket Head Cap Screw
11 1629 00	Cam Roll Stud	80 5136 00	$\frac{1}{4}$ " dia. x $\frac{7}{8}$ " long Dowel Pin
11 1630 00	Mold Slide Drive Arm	80 5185 00	$\frac{3}{8}$ " dia. x $1\frac{3}{4}$ " long Dowel Pin
11 1633 00	Mold Slide Clevis Pin	80 6562 00	$\frac{1}{2}$ " Bolt Size Washer
11 1635 00	Mold Slide Stop Block		
11 1636 00	Clevis Slide Block		
11 2021 00	Mold Slide Pinion Bracket		
11 2630 00	Mold Slide Drive Arm Pivot		
31 3419 00	Cam Roll		
80 1403 00	No. 23 Woodruff Key		

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Mold Slide Drive Assembly • Plate No. 4B

Part No.	Description	Part No.	Description
11 1012 00	Ejector & Mold Slide Support Guide—Front	80 3329 00	$\frac{3}{8}$ –16 x 4" long Hexagon Head Cap Screw
11 1600 00	Mold Slide Support	80 3502 00	$\frac{1}{4}$ –20 x $\frac{3}{4}$ " long Square Head Set Screw
11 1617 00	Mold Slide Support Gib	80 4428 00	10–32 x $\frac{3}{8}$ " long Half Dog Point Socket Set Screw
11 1621 00	Mold Slide Clevis	80 4444 00	$\frac{1}{4}$ –20 x 1" long Half Dog Point Socket Set Screw
11 1622 00	Mold Slide Support Gib—(Front)	80 4445 00	$\frac{1}{4}$ –20 x $\frac{3}{4}$ " long Half Dog Point Socket Set Screw
11 1623 00	Mold Slide Gib—Front	80 4531 00	$\frac{1}{4}$ –20 x $\frac{3}{4}$ " Socket Head Cap Screw
11 1624 00	Mold Slide Gib—Rear	80 5136 00	$\frac{1}{4}$ " dia. x $\frac{7}{8}$ " long Hardened Dowel Pin
11 1630 00	Mold Slide Drive Arm	80 5183 00	$\frac{3}{8}$ " dia. x 1" long Dowel Pin
11 1633 00	Mold Slide Clevis Pin	80 5185 00	$\frac{3}{8}$ " dia. x $1\frac{3}{4}$ " long Hardened Dowel Pin
11 1635 00	Mold Slide Stop Block	80 6127 00	$\frac{3}{8}$ –16 x $\frac{3}{8}$ " Thick Hexagon Nut
11 1636 00	Clevis Slide Block	80 6249 00	$\frac{1}{2}$ –13 x $\frac{5}{16}$ " thick Jam Nut
11 1637 00	Mold Slide Adjusting Tension Spring	80 6541 00	$\frac{3}{8}$ " Bolt Size x $\frac{3}{4}$ " O.D. Washer
11 2021 00	Mold Slide Pinion Bracket	80 6562 00	$\frac{1}{2}$ " Bolt Size x $\frac{7}{8}$ " O.D. Washer
12 2160 00	Washer	80 6731 00	$\frac{3}{8}$ " Plain Lock Washer
80 3325 00	$\frac{3}{8}$ –16 x $1\frac{1}{2}$ " long Hexagon Head Cap Screw		
80 3326 00	$\frac{3}{8}$ –16 x $2\frac{1}{4}$ " long Hexagon Head Cap Screw		

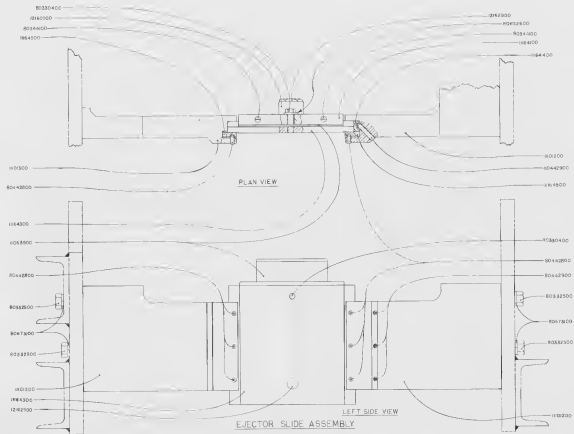
Plate No. 4C



Mold Slide Drive Assembly • Plate No. 4C

Part No.	Description	Part No.	Description
11 0006 00	Frame—Front Plate	80 3326 00	$\frac{3}{8}$ –16 x $2\frac{1}{4}$ " long Hexagon Head Cap Screw
11 0017 00	Main Shaft End Bearings	80 3349 00	$\frac{1}{2}$ –13 x $1\frac{1}{2}$ " Hexagon Head Cap Screw
11 1012 00	Ejector and Mold Slide Support Guide—Front	80 4440 00	$\frac{1}{4}$ –20 x $\frac{3}{8}$ " Oval Point Socket Set Screw
11 1016 00	Main Shaft	80 4444 00	$\frac{1}{4}$ –20 x 1" long Half Dog Point Socket Set Screw
11 1102 00	Mold Slide Support Anchor—Front	80 4445 00	$\frac{1}{4}$ –20 x $\frac{3}{4}$ " long Half Dog Point Socket Set Screw
11 1609 00	Mold Slide Support Adjusting Spring	80 4534 00	$\frac{1}{4}$ –20 x $\frac{5}{8}$ " long Socket Cap Screw
11 1619 00	Mold Slide Adjusting Gib	80 5134 00	$\frac{1}{4}$ " dia. x $\frac{3}{4}$ " long Dowel Pin
11 1620 00	Mold Slide	80 5706 00	$\frac{3}{32}$ " x $\frac{3}{4}$ " long Cotter Pin
11 1623 00	Mold Slide Gib—Front	80 6127 00	$\frac{3}{8}$ –16 x $\frac{3}{8}$ " Thick Jam Nut
11 1631 00	Mold Slide Drive Arm Pin	80 6249 00	$\frac{1}{2}$ –13 x $5/16$ " Thick Jam Nut
11 1632 00	Mold Slide Adjusting Screw	80 6541 00	$\frac{3}{8}$ " Bolt Size x $\frac{3}{4}$ " OD Washer
11 2021 00	Mold Slide Pinion Bracket	80 6562 00	$\frac{1}{2}$ " Bolt Size x $\frac{7}{8}$ " OD Washer
11 2630 00	Mold Slide Drive Arm Pivot	80 6564 00	$\frac{1}{2}$ " Bolt Size x $1\frac{1}{4}$ " Dia. Washer
80 1403 00	No. 23 Woodruff Key	80 6731 00	$\frac{3}{8}$ " Bolt Size Plain Lock Washer
80 3325 00	$\frac{3}{8}$ –16 x $1\frac{1}{2}$ " long Hexagon Head Cap Screw		

Plate No. 5



Ejector Slide Assembly • Plate No. 5

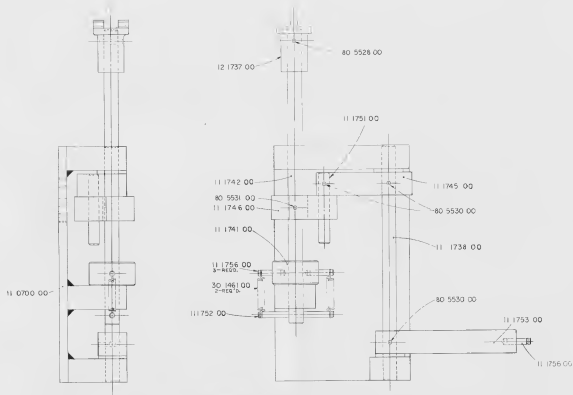
Part No.	Description	Part No.	Description
11 0639 00	Ejector Blade & Shim Assembly—6-pt.	80 3304 00	1/4-20 x 3/4" long Hexagon Head Cap Screw
11 1012 00	Ejector and Mold Slide Support Guide— Front	80 3325 00	3/8-16 x 1 1/2" long Hexagon Head Cap Screw
11 1013 00	Ejector and Mold Slide Support Guide— Rear	80 3441 00	1/4-20 x 1 1/4" long Slotted Headless Set Screw
11 1641 00	Ejector Blade Clamp	80 4428 00	10-32 x 3/8" Half Dog Point Socket Set Screw
11 1643 00	Ejector Blade Slide	80 4429 00	10-32 x 1" long Full Dog Point Socket Set Screw
11 1644 00	Ejector Slide Gib—Front & Rear Side		
11 1645 00	Ejector Slide Gib—Front	80 6526 00	1/4" Bolt Size x 19/32" thick Flat Washer
12 1609 00	Ejector Slide Cam Roll	80 6731 00	3/8" Plain Lock Washer
12 1629 00	Ejector Slide Cam Roll Stud		



Delivery Mechanism • Plate No. 6

Part No.	Description	Part No.	Description
11 0657 00	Delivery Drive Bracket	11 1692 00	Delivery Drive Pin
11 0686 00	Delivery Drive Pinion Gear Assembly (not shown)	11 1695 00	Delivery Slide Bottom Rack
11 1650 00	Delivery Slide—Bottom	11 1696 00	Delivery Drive Rod
11 1655 00	Slug Delivery Slide Center	11 1697 00	$\frac{3}{4}$ " External Retaining Ring
11 1658 00	Delivery Drive Lever	11 1698 00	$\frac{1}{8}$ " External Retaining Ring
11 1659 00	Delivery Slide—Top	31 3980 00	$\frac{3}{8}$ " External Retaining Ring
11 1660 00	Delivery Slug Guide	31 3985 00	$\frac{1}{4}$ " External Retaining Ring
11 1661 00	Delivery Roller	80 3403 00	8-32 x $\frac{3}{8}$ " Cup Point Headless Slotted Set Screw
11 1668 00	Delivery Return Spring	80 3709 00	4-40 x 5/16" Long Pan Head Machine Screw
11 1671 00	Delivery Slide Top Rack	80 3720 00	6-32 x $\frac{3}{8}$ " long Pan Head Machine Screw
11 1675 00	Delivery Pinion Spindle*	80 4514 00	10-32 x $\frac{3}{4}$ " long Hexagon Socket Cap Screw
11 1677 00	Delivery Roller Stud	80 4564 00	5/16-18 x 1" long Socket Head Cap Screw
11 1685 00	Delivery Drive Pinion Gear—Small*	80 6536 00	5/16" Washer—1/16" thick
11 1686 00	Delivery Drive Pinion Gear—Large*		
11 1691 00	Delivery Drive Arm Fulcrum		

*Sold as 11 0696 00 only



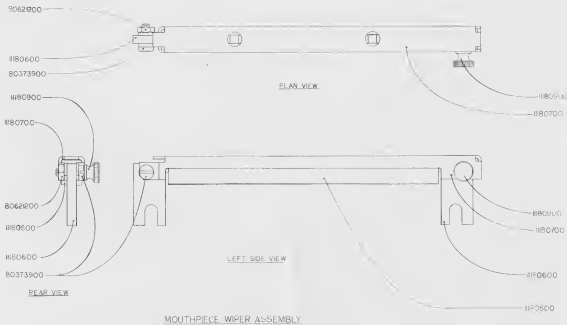
SAFETY CLUTCH SUPPORT BRACKET
ASSEMBLY

Safety Clutch Support and Mechanism • Plate No. 7

Part No.	Description
11 0700 00	Safety Clutch Support
11 1738 00	Safety Finger Shaft
11 1741 00	Safety Clutch Shaft Pin Support
11 1742 00	Safety Clutch Shaft—Lower
11 1745 00	Safety Finger—Upper
11 1746 00	Clutch Lever
11 1751 00	Safety Pin
11 1752 00	Spring Pin

Part No.	Description
11 1753 00	Safety Finger—Lower
11 1756 00	Spring Pin—Short
12 1737 00	Safety Clutch—Lower
30 1461 00	Safety Clutch Spring
80 5528 00	No. 2 Taper Pin—1" long
80 5530 00	No. 2 Taper Pin—1¼" long
80 5531 00	No. 2 Taper Pin—1½" long

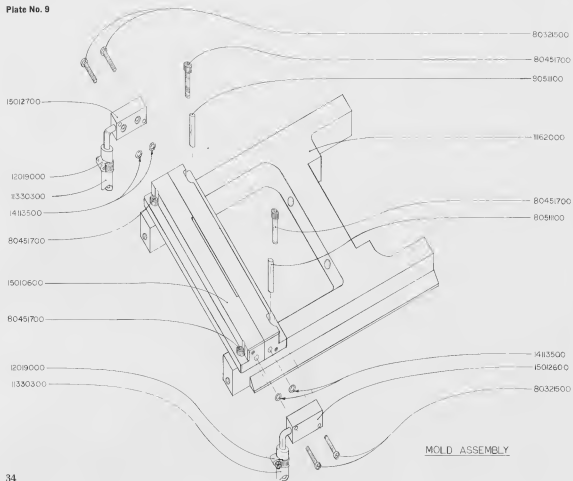
Plate No. 8



Mouthpiece Wiper Assembly - Plate No. 8

Part No.	Description	Part No.	Description
11 1804 00	Clamping Screw	11 1809 00	10-32 x $\frac{3}{8}$ " long Brass Knurled Finger
11 1805 00	Mouthpiece Wiper Felt		Screw
11 1806 00	Mouthpiece Wiper Mount	80 3739 00	8-32 x $\frac{1}{2}$ " long Pan Head Machine Screw
11 1807 00	Mouthpiece Wiper Clamp	80 6212 00	8-32 x $\frac{1}{8}$ " thick Jam Nut

Plate No. 9



MOLD ASSEMBLY

Mold Assembly • Plate No. 9

Part No.	Description
11 1620 00	Mold Slide
11 3303 00	Mold Hose
12 0190 00	Mold Hose Clamp
14 1135 00	Mold "O" Ring Seal
15 0126 00	Mold Connection Assembly (Front)

Part No.	Description
15 0127 00	Mold Connection Assembly (Rear)
80 3215 00	8-32 x $\frac{7}{8}$ " long Oval Fillister Head Screw
80 4517 00	10-32 x $1\frac{1}{4}$ " long Socket Head Cap Screw
80 5111 00	3/16" dia. x $1\frac{1}{4}$ " long Dowel Pin



